

### **REMARKS**

Claims 24 to 29 and 36 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. 5,511,949 (Thore) in view of U.S. 5,393,485 (Worz et al.). Claim 30 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Thore in view of Worz et al. and further in view of U.S. 5,900,207 (Danforth et al.). Claims 31, 32, 34 and 37 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Thore and Worz et al. and further in view of U.S. 6,648,596 (Grylls et al.). Claim 35 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Thore in view of Worz et al. and Grylls et al. and further in view of U.S. 6,827,556 (Simon).

Reconsideration of the application based on the following remarks is respectfully requested.

#### **35 U.S.C. §103(a) Rejections**

Claims 24 to 29 and 36 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. 5,511,949 (Thore) in view of U.S. 5,393,485 (Worz et al.). Claim 30 was rejected under 35 U.S.C. §103(a) as being unpatentable over Thore in view of Worz et al. and further in view of U.S. 5,900,207 (Danforth et al.). Claims 31, 32, 34 and 37 were rejected under 35 U.S.C. §103(a) as being unpatentable over Thore and Worz et al. and further in view of U.S. 6,648,596 (Grylls et al.). Claim 35 was rejected under 35 U.S.C. §103(a) as being unpatentable over Thore in view of Worz et al. and Grylls et al. and further in view of U.S. 6,827,556 (Simon).

Claim 24, the only independent claim, recites:

A method for manufacturing gas turbine components, comprising:  
    providing at least one metal powder and at least one foaming agent;  
    mixing the at least one metal powder with the at least one foaming agent,  
    compacting the resulting mixture to form at least one precursor; and  
    foaming the at least one precursor by heating the at least one precursor in a mold until a defined degree of foaming is reached;  
    cooling the at least one precursor when the defined degree of foaming is reached to terminate the foaming, the cooled at least one precursor being at least one gas turbine component having a closed and supporting exterior wall.

The Examiner states, with regard to the primary reference, that “as applied to claims 24-29 and 36, Thore teaches a method of fixedly joining a plurality of hollow gas turbine blades including a closed and supporting exterior wall.” The Examiner admits that Thore fails to disclose or suggest the steps of providing . . . , mixing . . . , compacting . . . , foaming . . . , [and] cooling . . . ” of claim 24, relying on Worz, a patent directed to “a process for the production of metal foam elements” (Worz, col. 1).

Thore is directed to a method of welding hollow blades to the disk of a gas turbine rotor. (Col. 2, lines 45 et seq.). It contains no mention whatsoever of using metal powder or foaming agents to form a gas turbine component.

Worz, as the Examiner apparently concedes, does not disclose, or in any way suggest that its process is to be used for the manufacture of gas turbine components. To the contrary, the only application mentioned in Worz is for “crush zones of motor vehicles” (col. 3, line 68 to col. 4, line 1).

Neither Thore nor Worz disclose, or in any way suggest that foamed metal powder can be used to form a “gas turbine component having a closed and supporting exterior wall,” as claimed.

Further, Worz is directed to an *extruder* in which metallic powder and foaming agent powder mixture “P” is heated by friction in groove 5, before being extruded through extrusion die 13 as the extrudate shown exiting the extrusion device 1.

Claim 24 recites that the precursor is heated “in a mold” until a defined degree of foaming is reached, and then cooled when the defined degree of foaming is reached. Worz does not disclose this process.

As the examiner recognizes at page 3 of the Office Action, the extrusion process of Worz would, if applied to the claims, correspond to the “compacting” step. The claims recite heating

the compacted mixture in a *mold*.

It is therefore respectfully submitted that Thore and Worz are not combinable, and even if combined, would not disclose the method of claim 24. Withdrawal of the rejection of claims 24 to 32, and 34 to 37 thus is respectfully requested.

With regard to claim 28, Worz does not teach that “the at least one metal powder includes a plurality of metal powders, each of the plurality of metal powders having different melting points.” Although Worz mentions aluminum, iron, nickel, and copper, it nowhere discloses or suggests combining more than one for processing in the extruder of Worz. Withdrawal of the rejection of claims 28 is thus respectfully requested on this basis as well.

Similarly, with regard to claim 29, Worz does not teach “wherein the at least one metal powder includes a plurality of metal powders, each of the plurality of metal powders having different powder granularities.” Worz nowhere discloses or suggest combining plural metal powders, each having “different powder granularities”, for processing in the extruder of Worz. Withdrawal of the rejection of claims 29 is thus respectfully requested on this basis as well.

Claim 30 was rejected under 35 U.S.C. §103(a) as being unpatentable over Thore in view of Worz et al. and further in view of Danforth et al. This rejection is respectfully traversed. Danforth is asserted solely for the additional limitations set forth in dependent claim 30, and thus cannot cure the deficiencies in Thore and Worz set forth above. Further, although Danforth does mention that ceramics can be used in its method, Danforth is wholly unrelated to the use of foaming agents and, and Worz exclusively discusses the use of metals and metal alloys in connection with its foaming agents. A person of ordinary skill in art at the time of the invention, upon examining Thore, Worz, and Danforth, would have no reason to believe that a combination of metals and ceramics would be usable in the process of Worz. Withdrawal of the rejection of claims 29 is thus respectfully requested on this basis as well.

Claims 31, 32, 34 and 37 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Thore and Worz et al. and further in view of Grylls et al. This rejection is respectfully

traversed. Grylls is asserted solely for the additional limitations set forth in dependent claims 31, 32, 34, 37, and thus cannot cure the deficiencies in Thore and Worz set forth above. Further, claim 31 recites “wherein at least one supporting and/or function-relevant component made of a non-foamable material is at least partially surrounded by foam or partially embedded in foam *during the foaming step*”, and claim 34 further specifies “wherein the at least one gas turbine component is a blade, and wherein when the at least one precursor is foamed in the mold, a blade root made of a non-foamable material is partially surrounded by foam or partially embedded in foam *during the foaming step*.” In sharp contrast, in accordance with Grylls, a ceramic foam region is first formed “as a freestanding element” (Figure 6, and discussion at cols. 5-6, col. 8, lines 43-55), and is *subsequently* joined with the metallic non-foam region (Figure 6). Withdrawal of the rejection of claims 31, 32, 34, and 37 is thus respectfully requested on this basis as well.

Claim 35 was rejected under 35 U.S.C. §103(a) as being unpatentable over Thore in view of Worz et al. and Grylls et al. and further in view of Simon. As Simon is asserted solely for the additional limitations set forth in dependent claim 35, it cannot cure the deficiencies in Thore, Worz, and Grylls set forth above. Withdrawal of the rejection of claim 35 is thus respectfully requested.

**CONCLUSION**

It is respectfully submitted that the application is in condition for allowance and applicants respectfully request such action.

If any additional fees are deemed to be due at this time, the Assistant Commissioner is authorized to charge payment of the same to Deposit Account No. 50-0552.

Respectfully submitted,

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